

**Translation**

**PATENT COOPERATION TREATY**

PCT/JP2003/010274



**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>903195</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/JP2003/010274</b>	International filing date ( <i>day/month/year</i> ) <b>12 August 2003 (12.08.2003)</b>	Priority date ( <i>day/month/year</i> ) <b>14 August 2002 (14.08.2002)</b>
International Patent Classification (IPC) or national classification and IPC <b>H05H 1/46, H01L 21/31, B01J 19/08</b>		
Applicant <b>TOKYO ELECTRON LIMITED</b>		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of <u>3</u> sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>	
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>	

Date of submission of the demand <b>10 March 2004 (10.03.2004)</b>	Date of completion of this report <b>10 November 2004 (10.11.2004)</b>
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2003/010274

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is language of a translation furnished for the purpose of:

- ☐ international search (under Rules 12.3 and 23.1(b))  
☐ publication of the international application (under Rule 12.4)  
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ The international application as originally filed/furnished

☒ the description:

pages \_\_\_\_\_ 1-12 \_\_\_\_\_, as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the claims:

pages \_\_\_\_\_ 2, 3, 5, 6 \_\_\_\_\_, as originally filed/furnished

pages\* \_\_\_\_\_, as amended (together with any statement) under Article 19

pages\* \_\_\_\_\_ 1, 7-10 \_\_\_\_\_ received by this Authority on 02 September 2004 (02.09.2004)

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the drawings:

pages \_\_\_\_\_ 1-7 \_\_\_\_\_, as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☒ the claims, Nos. \_\_\_\_\_ 4 \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (*specify*): \_\_\_\_\_

☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages \_\_\_\_\_

☒ the claims, Nos. \_\_\_\_\_ 11-20 \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (*specify*): \_\_\_\_\_

☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP 03/10274

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	1-3, 5-10	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-3, 5-10	NO
Industrial applicability (IA)	Claims	1-3, 5-10	YES
	Claims		NO

**2. Citations and explanations**

Document 1: JP 10-294199 A (Hitachi, Ltd.), paragraph 0016; fig. 4 (Family: none)

Document 2: JP 2000-331998 A (Hitachi, Ltd.), 30 November 2000, paragraphs 0023 to 0026; fig. 1 (Family: none)

Document 3: JP 8-106994 A (Sumitomo Metal Industries, Ltd.), 23 April 1996, paragraphs 0041 and 0046 to 0050; fig. 1 to 3 & US 5234526 A1 & EP 586579 A

Document 4: JP 63-126196 A (Nippon Telegraph and Telephone Corporation), 30 May 1988, page 3, upper left column, line 9 to upper right column, line 17; page 4, upper right column, lines 2 to 16; fig. 1 and 3 (Family: none)

Newly cited document:

Document 5: JP 2001-167900 A (Rohm Co., Ltd.), 22 June 2001, paragraph 0025; fig. 1 (Family: none)

Claims 1 to 3 and 5 to 10

Document 1 contains the wording (that) "a cylindrical quartz window (2b) closed with a donut-shaped plate on one side and an internal disc conductor (11b) are installed on top of an open-top vacuum container (1b) to seal said container. A processing chamber (1) is thus formed."

Microwaves introduced via a coaxial line (8) have their direction of propagation changed to their radial direction by a conversion corner (9a), and are propagated through the quartz window (2b). When the microwaves reach the side of the device, the direction of propagation of the microwaves is changed by  $90^\circ$  and waves are propagated in a downward direction, generating cylindrical plasma (16a). Microwaves are propagated along the propagation path which passes through the quartz window and is formed by plasma (16a) and a conductor plate (10), from top to bottom. As a result, microwave output is increased, and microwaves are discharged further forward (in a downward direction) than the plasma (16a) which is generated, and plasma is generated further from these microwaves which are discharged. ...By feeding ashing gas downwards from the outer periphery of the internal disc conductor (11a), it is possible to introduce the ashing gas into the plasma with a high degree of efficiency, which also acts to improve radical generation efficiency. This offers the effect of being able to carry out ashing at high speed." Therefore the plasma processing device set forth in document 1 has a cylindrical quartz window formed in such a manner as to extend from the peripheral part of the donut-shaped plate (part of the quartz window) towards the stage side, and has a means of feeding gas to the outer periphery of the internal disc conductor (11a) (understood to be a typographical error for 11b) in line with the cylindrical quartz window. Moreover, vacuum containers are generally conductors.

Document 2 contains the wording that "paragraph [0018]...the vacuum container has a truncated cone shape, so the cross-sectional area of the gap between the metal container and the vacuum container changes gradually, enabling reflection of microwaves to be reduced", and

Document 4 discloses a feature wherein the thickness of a dielectric substance area in the direction of propagation of microwaves is set to  $\lambda g(2n-1)/4$  in order to set the strength distribution of the electric field within the dielectric substance area (9A) as a standing wave. Document 4 also discloses a cup-shaped dielectric substance (17A-2) which surrounds the plasma generating area.

Document 5 sets forth a feature wherein the lower surface of the dielectric member (2) is curved upwards.

Moreover, the shape of the inner surface of the top plate unit, the interrelation between the top plate unit and the chamber, and the provision of a slot in the antenna would merely be design matters to a person skilled in the art.

It would therefore be easy for a person skilled in the art to apply the feature set forth in documents 2 to 5 to the plasma processing device set forth in document 1, thereby exhibiting a gradually curved surface from the flat plate portion to the sidewall portion, to constitute the invention set forth in claims 1 to 3 and 5 to 10. Therefore the invention set forth in claims 1 to 3 and 5 to 10 does not involve an inventive step in the light of documents 1 to 4.

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**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: I-4

Claims 11 to 20

The applicant added claims 11 to 20 as of 2 September 2004.

Claim 1 contains the wording that "the thickness of the aforementioned sidewall portion (4b) is thinner than the thickness of the aforementioned flat plate portion (4a)".

The applicant claims fig. 1 and 2 as originally filed as the basis for this disclosure. However, this assertion is unacceptable. This is because fig. 1 and 2 are not design drawings, and hence unless clearly stated, it is impossible to compare the thickness of the sidewall portion (4b) and the flat plate portion (4a). In addition, the description at the time of filing only contains the wording that "H1, the thickness of the sidewall (4b),...is  $\lambda g/4$  or more", and even through there is a disclosure concerning the thickness of the sidewall (4b), a comparison of the thickness of the top plate unit and the sidewall portion is neither disclosed nor suggested.

The amendments by addition of claims 11 to 20 therefore go beyond the scope at the time of filing.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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